Tennessee

Tennessee had the seventeenth largest population and the fourteenth largest utility generating capability in 1996. Most of the electricity in Tennessee is generated at coal-fired plants. Four of the five largest plants in the State, including Cumberland, the largest, are coal-fired. Tennessee is also reliant on nuclear power and hydroelectric power. The second largest plant in the State, Sequoyah, is one of the two nuclear plants in Tennessee. Watts Bar, the other Tennessee nuclear plant, is the last nuclear power plant to come on-line in the United States. The federally owned Tennessee Valley Authority (TVA), a creation of Franklin D. Roosevelt's New Deal and the largest utility in the United States, is by far the largest utility presence in Tennessee. With the exception of some small hydroelectric plants operated by the United States Army Corps of Engineers, TVA produces and sells all electric power in the State. TVA provides wholesale power under 10-year contracts to 159 municipal utilities and cooperatives in 7 southern States.[1]

In 1996, coal-fired plants produced 60.2 percent of Tennessee's net generation; the two nuclear units produced 24.9 percent. Nuclear generation has increased and coal generation has decreased since 1986. This increase in the nuclear share of generation is largely a result of the fact that Sequoyah did not produce any electricity (but did consume some, resulting in negative net generation) in 1986, and in 1996 Watts Bar 1 began producing electricity.

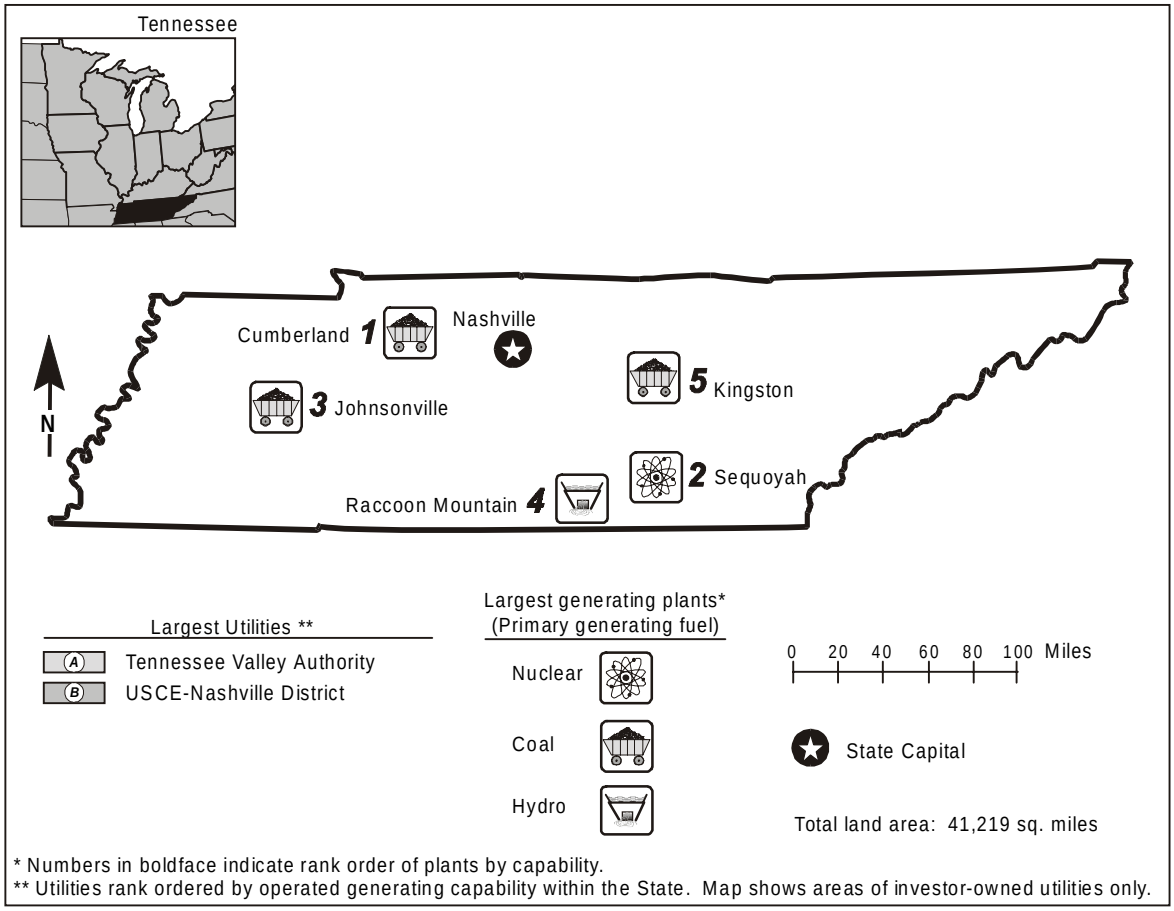
The Clean Air Act Amendments of 1990 specified 6,332 megawatts of Tennessee nameplate capacity at four plants to begin compliance with stricter emissions standards for sulfur dioxide (SO_2) and nitrogen oxides (NO_x) in 1995. In 1996, Tennessee's emissions of SO_2, NO_x, and carbon dioxide ranked ninth, thirteenth, and sixteenth, respectively, in the United States.

Tennessee's SO_2 emissions from electricity generators declined slightly from 1986 to 1991, but then were reduced much more in 1996. It is likely that Tennessee will need to design a State implementation plan (SIP) for reducing ground-level ozone in response to a proposal released by the Environmental Protection Agency (EPA) in October 1998. The EPA SIP call proposal does not mandate which sources must reduce pollution. However, EPA states that utilities would be one of the most likely sources of NO_x emissions reductions.

Interest in restructuring the electric power industry in Tennessee is very low due to the gargantuan presence of TVA, a Federal utility that is not subject to Tennessee's Public Utility Commission control, and the relatively low price of electricity in the State. In 1996, the average price, 5.24 cents per kilowatthour, was the ninth least expensive in the United States. Some of TVA's wholesale customers have discussed allowing 5-year power purchase contracts rather than the current 10-year rolling contracts with TVA. At least one municipal (in Virginia) has left the TVA system. Just recently, the TVA and the Tennessee Public Power Association reached an agreement whereby TVA could sell retail power outside its service territory, but must permit marketers to sell in TVA's territory. The 10-year power purchase contracts will remain in place, but the agreement will allow reduced purchases in exchange for recovery of stranded investment for lost load.[2]

[1]The seven States are Tennessee, Kentucky, Virginia, North Carolina, Georgia, Alabama, and Mississippi.

[2]Energy Information Administration, Status of State Electric Utility Deregulation Activity, http://www.eia.doe.gov/cneaf/electricity/chg_str/tab5rev.html.



* Numbers in boldface indicate rank order of plants by capability.
** Utilities rank ordered by operated generating capability within the State. Map shows areas of investor-owned utilities only.

Table 1. 1996 Summary Statistics

Item	Value	U.S. Rank
NERC Region(s)		ECAR/SERC
Net Exporter or Importer		Importer
State Primary Generating Fuel		Coal
Population (as of 7/96)	5,307,381	17
Average Revenue (cents/kWh)	5.24	[a]9
Industry		
Capability (MWe)	17,870	[b]16
Generation (MWh)	92,142,427	[b]14
Capability/person (KWe/person)	3.37	[b]15
Generation/person (MWh/person)	17.36	[b]10
Sulfur Dioxide Emissions (Thousand Short Tons)	510	9
Nitrogen Oxide Emissions (Thousand Short Tons)	208	13
Carbon Dioxide Emissions (Thousand Short Tons)	60,191	16
Sulfur Dioxide/sq. mile (Tons)	12.37	10
Nitrogen Oxides/sq. mile (Tons)	5.04	15
Carbon Dioxide/sq. mile (Tons)	1,460.27	19

Item	Value	U.S. Rank
Utility		
Capability (MWe)	17,253	14
Generation (MWh)	88,647,111	14
Average Age of Coal Plants	35 years	
Average Age of Oil-fired Plants	21 years	
Average Age of Gas-fired Plants	25 years	
Average Age of Nuclear Plants	10 years	
Average Age of Hydroelectric Plants	34 years	
Average Age of Other Plants	--	
Nonutility[c]		
Capability (MWe)	617	25
Percentage Share of Capability	3.5	36
Generation (MWh)	3,495,316	23
Percentage Share of Generation	3.8	33

-- = Not applicable.

Table 2. Five Largest Utility Plants, 1996

Plant Name	Type	Operating Utility	Net Capability (MWe)
1. Cumberland	Coal	Tennessee Valley Authority	2,448
2. Sequoyah	Nuclear	Tennessee Valley Authority	2,223
3. Johnsonville	Coal/Oil	Tennessee Valley Authority	2,006
4. Raccoon Mountain	Hydro	Tennessee Valley Authority	1,532
5. Kingston	Coal	Tennessee Valley Authority	1,434

Table 3. Top Two Utilities with Largest Generating Capability, and Type, Within the State, 1996
(Megawatts Electric)

Utility	Net Summer Capability	Net Coal Capability	Net Oil Capability	Net Gas Capability	Net Nuclear Capability	Net Hydro/Other Capability
A. Tennessee Valley Authority	16,734	8,615	1,096	472	3,345	3,206
B. USCE-Nashville District	519	0	0	0	0	519
Total	17,253	8,615	1,096	472	3,345	3,725
Percentage of Industry Capability	96.5	--	--	--	--	--

-- = Not applicable.

Figure 1. Utility Generating Capability by Primary Energy Source, 1996

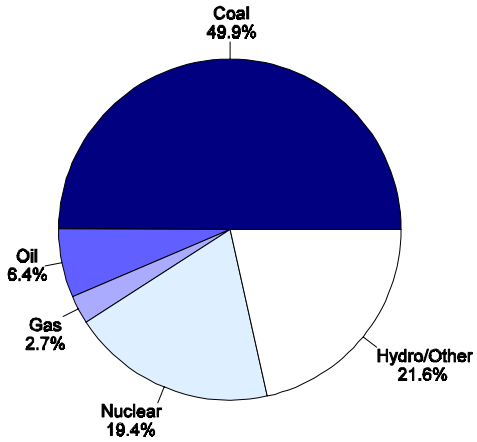


Figure 2. Utility Generation by Primary Energy Source, 1996

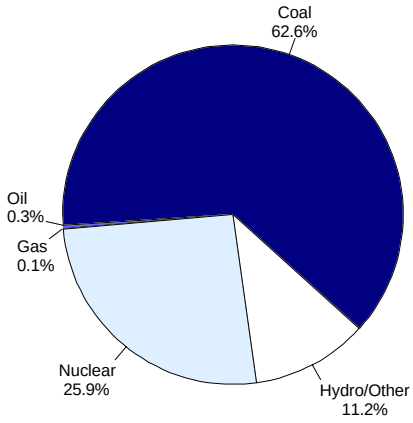


Figure 3. Energy Consumed at Electric Utilities by Primary Energy Source, 1996

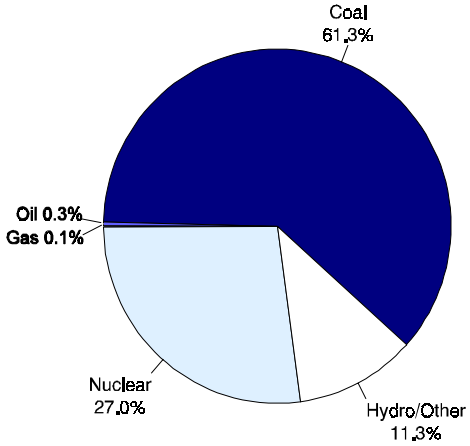


Table 4. Electric Power Industry Generating Capability by Primary Energy Source, 1986, 1991, and 1996
(Megawatts Electric)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	9,289	8,702	8,615	53.4	52.2	48.2
Oil	1,152	1,100	1,096	6.6	6.6	6.1
Gas	516	480	472	3.0	2.9	2.6
Nuclear	2,296	2,244	3,345	13.2	13.5	18.7
Hydro/Other	3,750	3,743	3,725	21.5	22.5	20.8
Total Utility	17,003	16,269	17,253	97.7	97.6	96.5
Total Nonutility	401	403	617	2.3	2.4	3.5
Industry	17,404	16,672	17,870	100.0	100.0	100.0

Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1986, 1991, and 1996
(Thousand Kilowatthours)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	51,107,785	46,671,234	55,504,189	86.9	61.3	60.2
Oil	126,248	160,072	257,586	0.2	0.2	0.3
Gas	--	17,014	60,783	--	(s)	0.1
Nuclear	(104,602)	16,586,744	22,924,239	-0.2	21.8	24.9
Hydro/Other	5,325,503	10,496,606	9,900,314	9.1	13.8	10.7
Total Utility	56,454,934	73,931,670	88,647,111	96.0	97.1	96.2
Total Nonutility	2,366,039	2,242,435	3,495,316	4.0	2.9	3.8
Industry	58,820,973	76,174,105	92,142,427	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero percentage less than 0.05.

Table 6. Electric Power Industry Consumption by Primary Energy Source, 1986, 1991, and 1996
(Quadrillion Btu)

Fuel	1986	1991	1996	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Coal	0.501	0.468	0.552	77.8	54.7	55.5
Oil	0.001	0.002	0.003	0.2	0.2	0.3
Gas	--	(s)	0.001	--	--	0.1
Nuclear	--	0.178	0.244	--	20.9	24.5
Hydro/Other	0.056	0.109	0.102	8.6	12.7	10.3
Total Utility	0.558	0.756	0.901	86.6	88.5	90.6
Total Nonutility	0.086	0.098	0.093	13.4	11.5	9.4
Industry	0.645	0.854	0.994	100.0	100.0	100.0

-- = Not applicable. (s) = Nonzero value less than 0.0005.

Figure 4. Utility Generation of Electricity by Primary Energy Source, 1986-1996

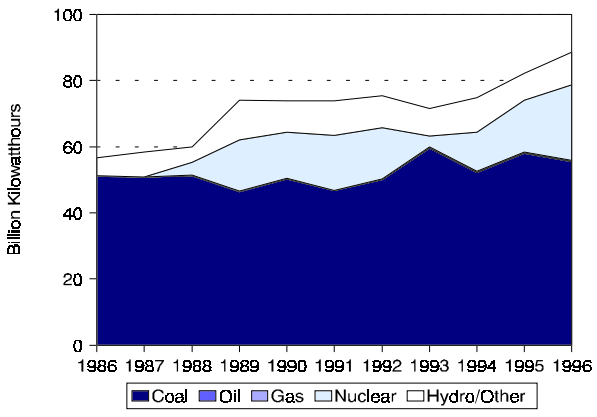


Figure 5. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986-1996
(1996 Dollars)

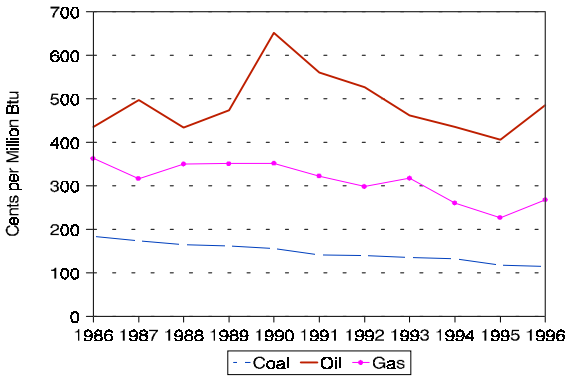


Table 7. Utility Delivered Fuel Prices for Coal, Oil, and Gas, 1986, 1991, and 1996
(Cents per Million Btu, 1996 Dollars)

Fuel	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Coal	183.2	140.7	114.6	-4.6
Oil	434.8	560.1	484.6	1.1
Gas	--	--	--	--

-- = Not applicable.

Table 8. Electric Power Industry Emissions Estimates, 1986, 1991, and 1996
(Thousand Short Tons)

Emission Type	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)
Sulfur Dioxide	798	776	510	-4.4
Nitrogen Oxides[d] . .	198	198	208	0.5
Carbon Dioxide[d] . . .	50,694	53,741	60,191	1.7

Figure 6. Estimated Sulfur Dioxide Emissions, 1986-1996

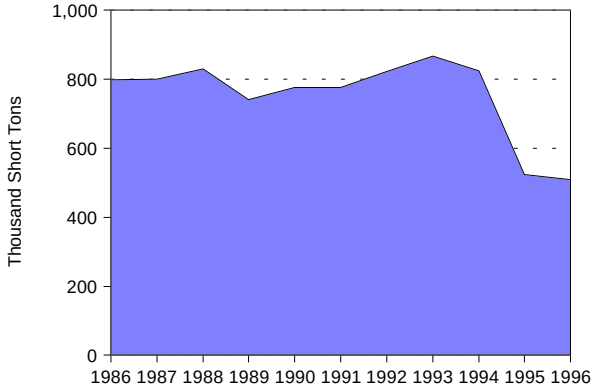


Figure 7. Estimated Nitrogen Oxide Emissions, 1986-1996

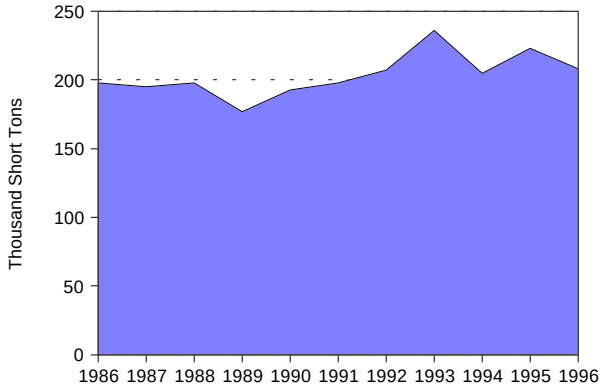


Figure 8. Estimated Carbon Dioxide Emissions, 1986-1996

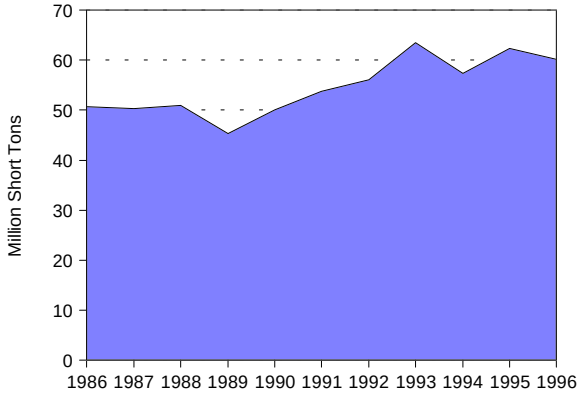


Table 9. Utility Retail Sales by Sector, 1986, 1991, and 1996
(Megawatthours)

Sector	1986	1991	1996	Annual Growth Rate 1986-1996 (Percent)	Percentage Share 1986	Percentage Share 1991	Percentage Share 1996
Residential .	25,884,198	29,605,275	35,333,276	3.2	38.2	37.8	40.3
Commercial	8,733,881	12,096,992	5,548,085	-4.4	12.9	15.4	6.3
Industrial . .	32,196,025	35,667,296	45,781,283	3.6	47.5	45.5	52.2
Other	993,600	1,020,578	996,370	0.0	1.5	1.3	1.1
Total	67,807,702	78,390,141	87,659,014	2.6	100.0	100.0	100.0

Figure 9. Nuclear Power Capacity Factor Comparison, 1986-1996

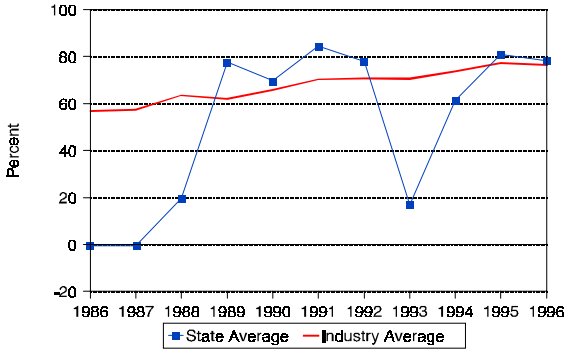


Table 10. Utility Retail Sales Statistics, 1986, 1991, and 1996

Item	Investor-Owned Utility	Public	Federal	Cooperative	Total
			1986		
Number of Utilities	4	63	1	25	93
Number of Retail Customers	36,312	1,537,859	43	539,670	2,113,884
Retail Sales (MWh)	2,727,372	44,850,490	9,875,892	10,353,948	67,807,702
Percentage of Retail Sales	4.0	66.1	14.6	15.3	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	86,403	2,928,686	573,863	714,847	4,470,794
Percentage of Revenue	1.9	65.5	16.6	16.0	100.0
			1991		
Number of Utilities	4	63	1	26	94
Number of Retail Customers	39,111	1,684,485	57	616,307	2,339,960
Retail Sales (MWh)	3,328,252	52,291,676	10,029,295	12,740,918	78,390,141
Percentage of Retail Sales	4.3	66.7	12.8	16.3	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	90,271	3,209,089	399,850	840,605	4,589,395
Percentage of Revenue	2.0	69.9	9.8	18.3	100.0
			1996		
Number of Utilities	3	63	1	25	92
Number of Retail Customers	42,304	1,806,324	43	692,736	2,541,407
Retail Sales (MWh)	1,894,673	61,363,703	8,367,390	16,033,248	87,659,014
Percentage of Retail Sales	2.2	70.0	9.6	18.3	100.0
Revenue from Retail Sales (thousand 1996 $)[e]	82,190	3,336,437	238,198	936,883	4,593,708
Percentage of Revenue	1.8	72.6	5.2	20.4	100.0